

Implications of Changes in Historic Disturbance Patterns to Prairie-Chickens



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Heath Hen

Tympanuchus cupido cupido

“Lack of awareness of the region’s historical fire ecology also led to the state legislature to require firebreaks when protecting the heath hen.”

General Notes on Prairie Chickens

Grassland obligate prairie grouse

Evolved in grasslands/shrublands with frequent fire and few trees.

Avoid vertical structure

Require large areas of rangeland with limited agriculture (<25%?).

Habitat Needs

Lekking

- Elevated, open areas
- Lek complexes

Brood-Rearing

- Forb/insect-rich areas
- Disturbance necessary?

Nesting

- Grasslands and Shrublands
- Perennial cover

Winter

- Seeds and green vegetation
- Perennial cover

Disturbance

- Bare Ground
- Annual Forbs and Grasses
- Perennial Forbs and Grasses
- Shrubs
- Young woodland or trees
- Mature woodland or trees

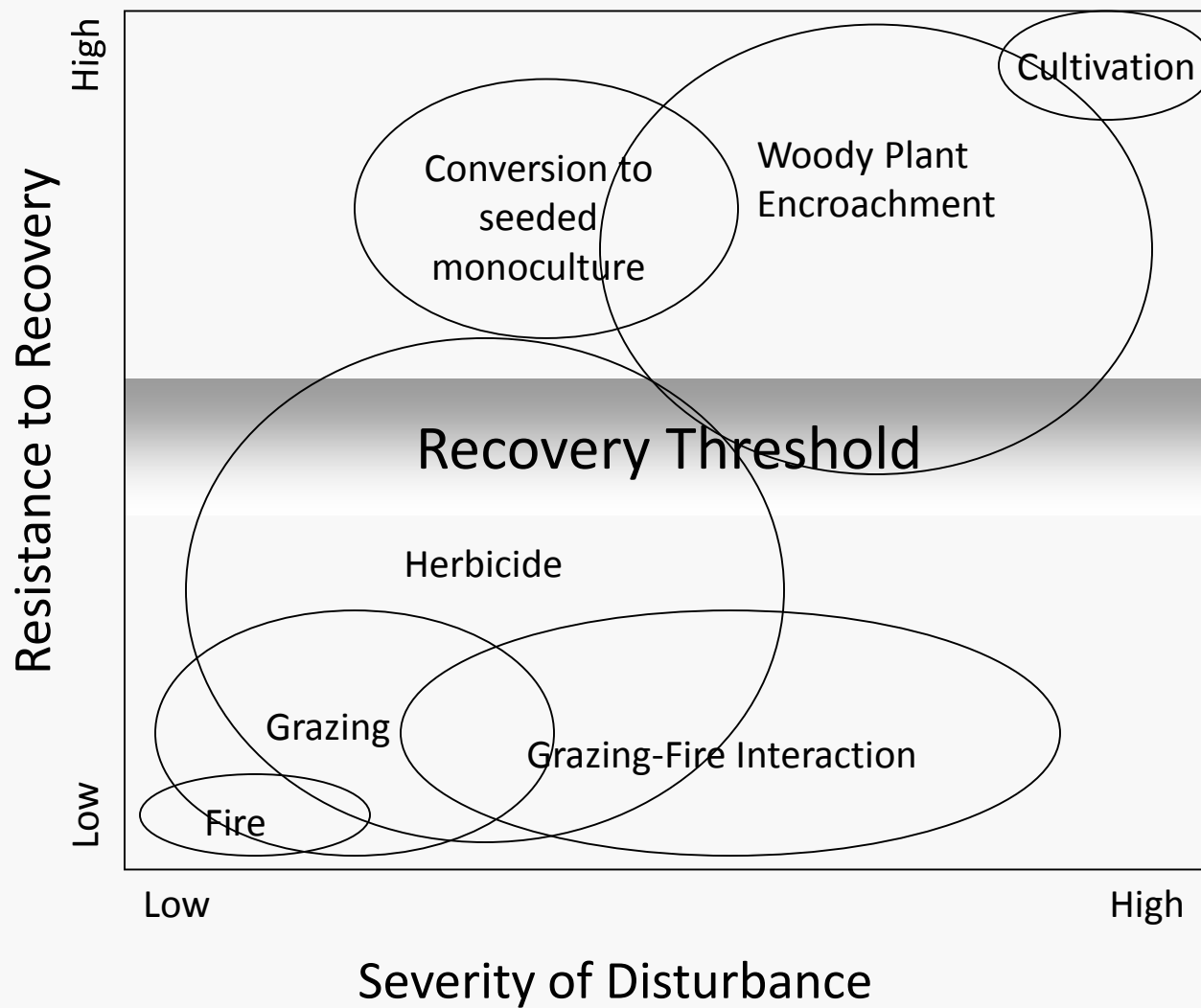


Scale of Disturbance

At coarse scales, fire is critical to prevent conversion to woodland.

At fine scales, fire creates diversity for various seasons of use.

Scale of response poorly understood.



Greater Prairie-Chicken

Tympanuchus cupido

Occurs in tallgrass prairie

Retraction of range due largely to conversion.

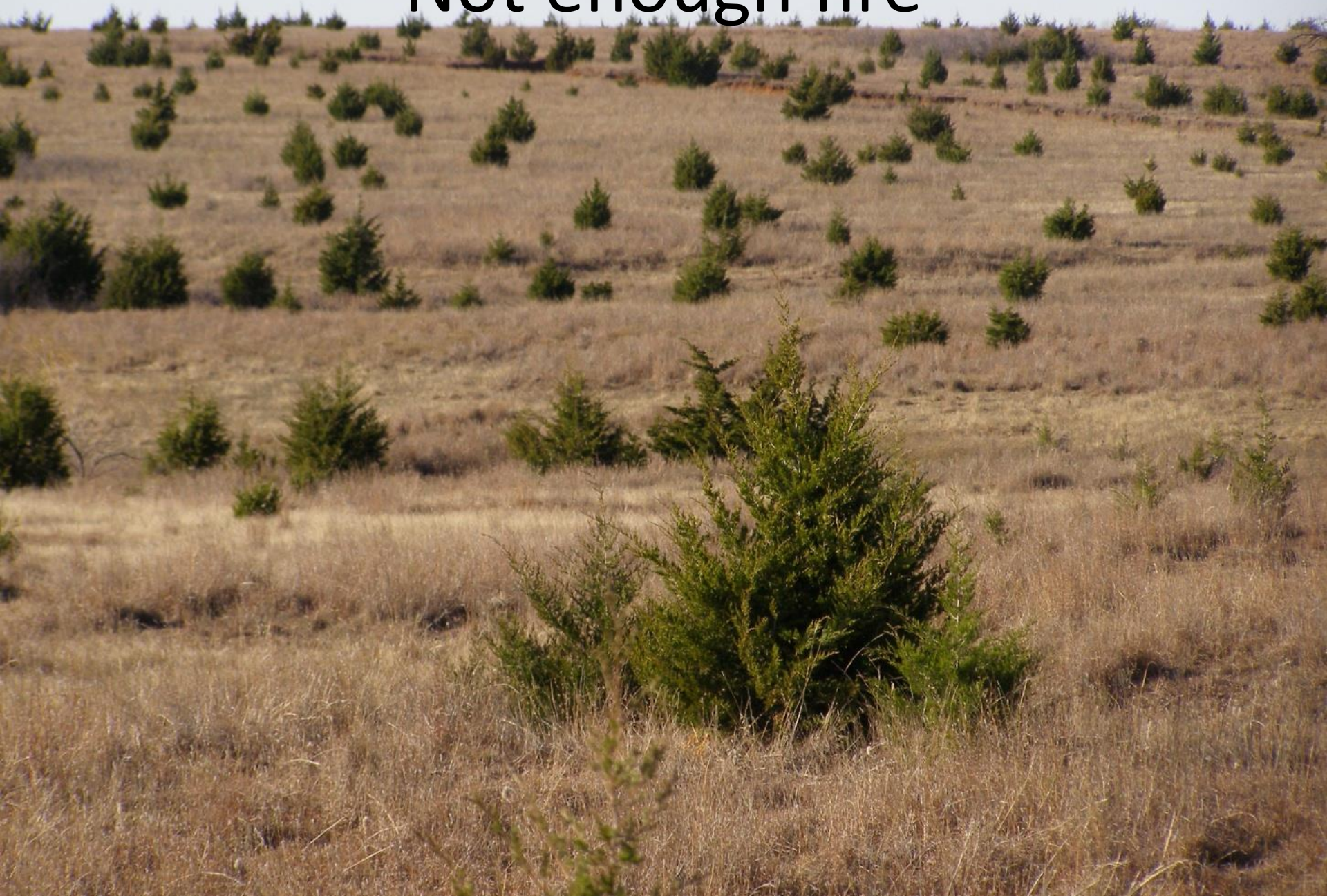
Still abundant in KS, NE, SD

Woody plant encroachment is rapidly occurring.



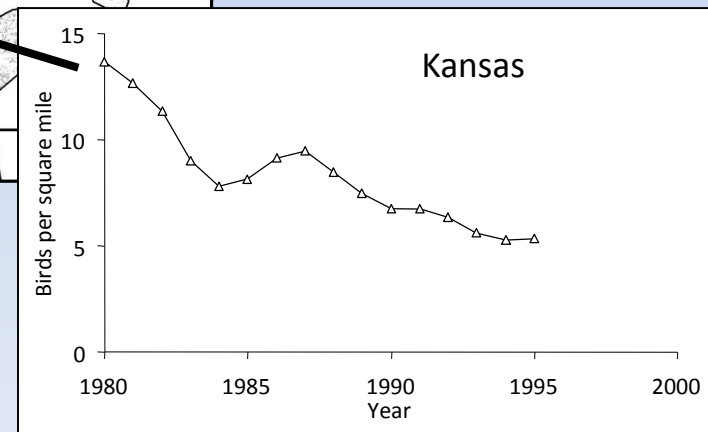
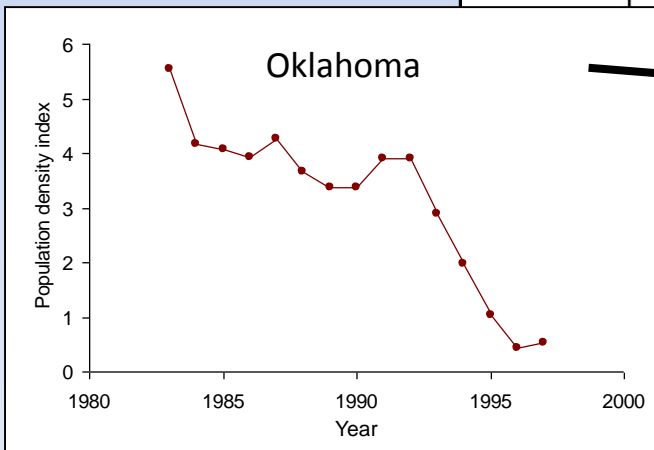
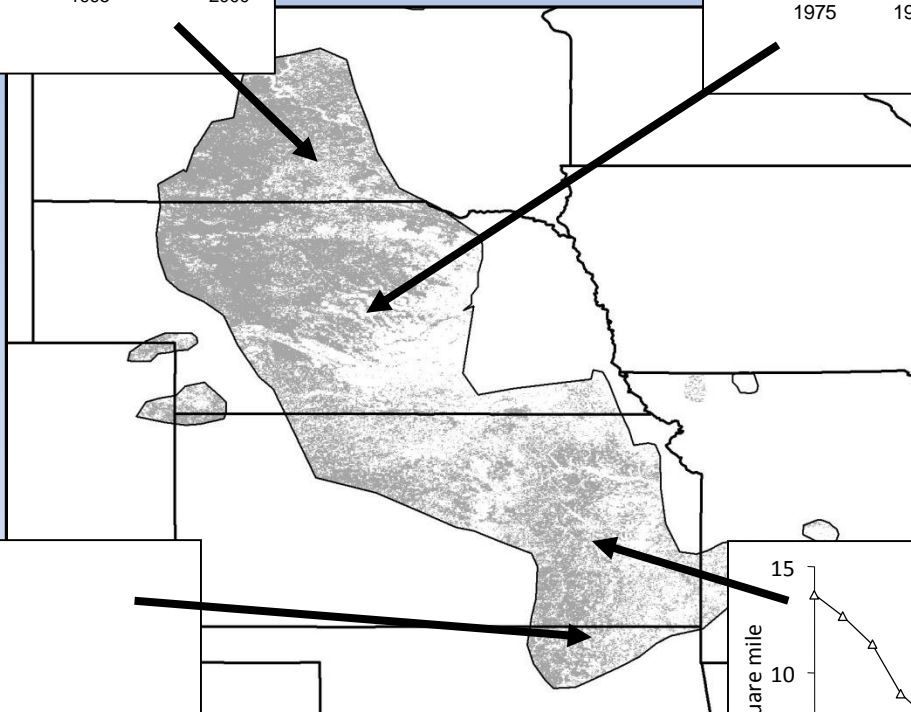
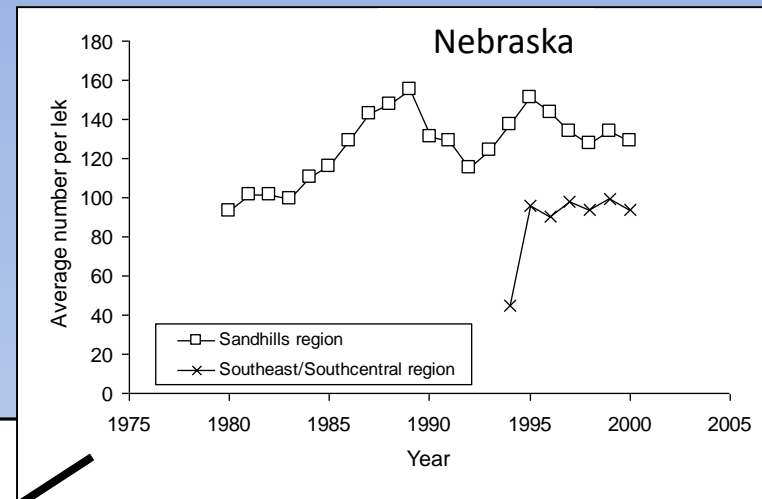
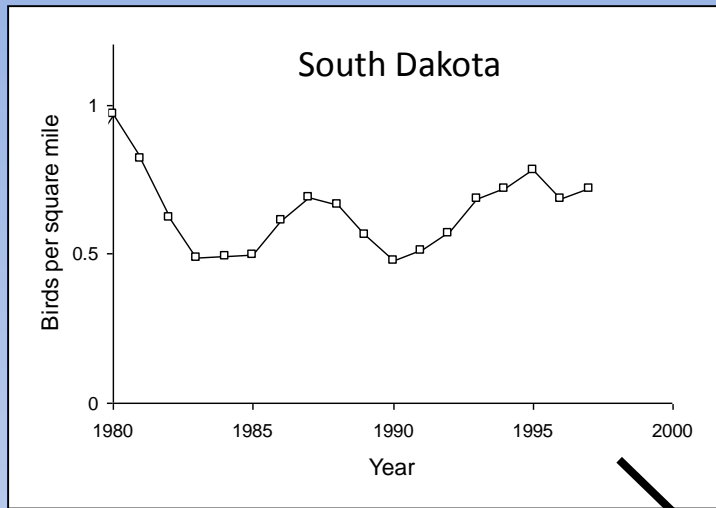


Not enough fire

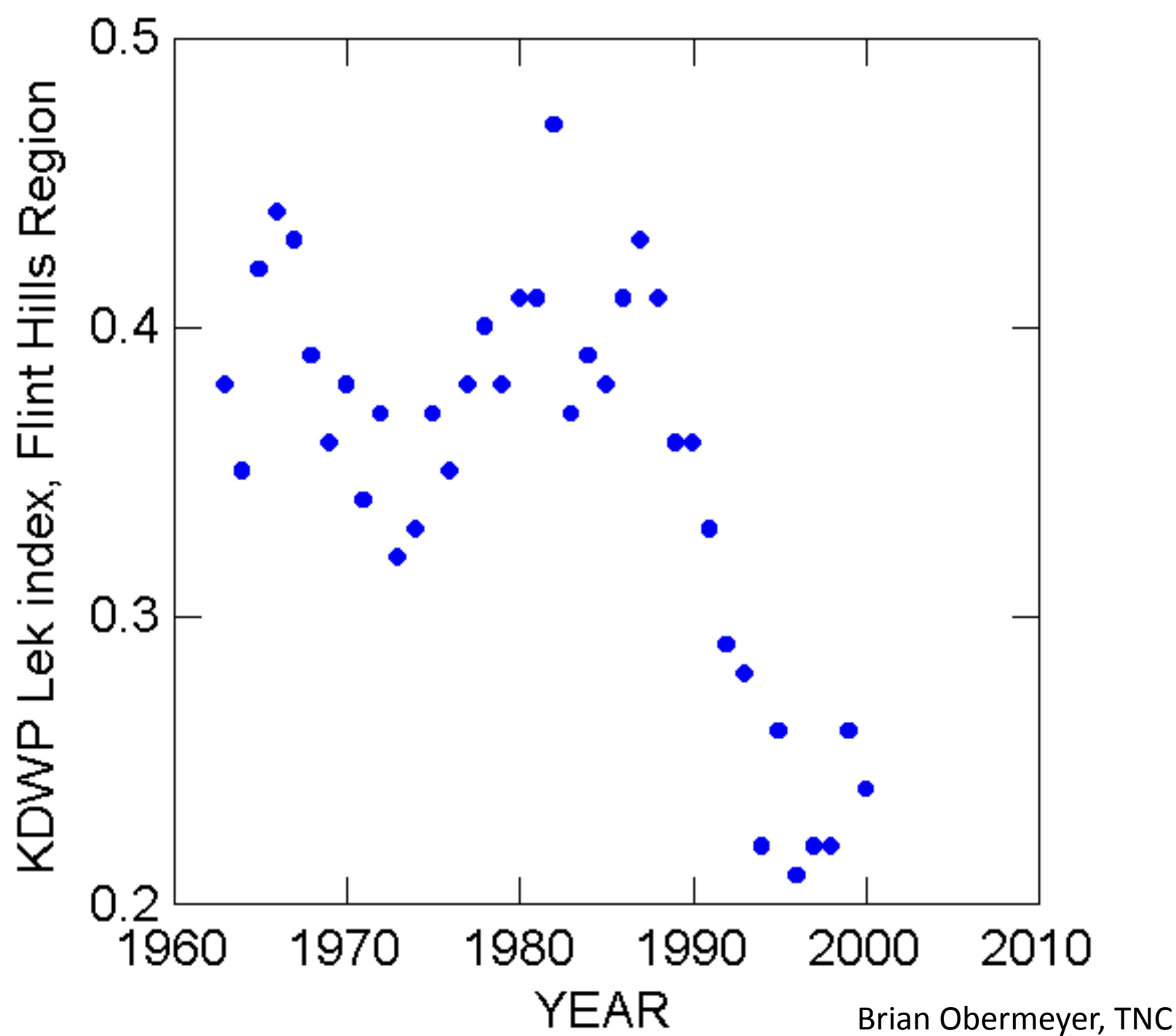


Too much fire





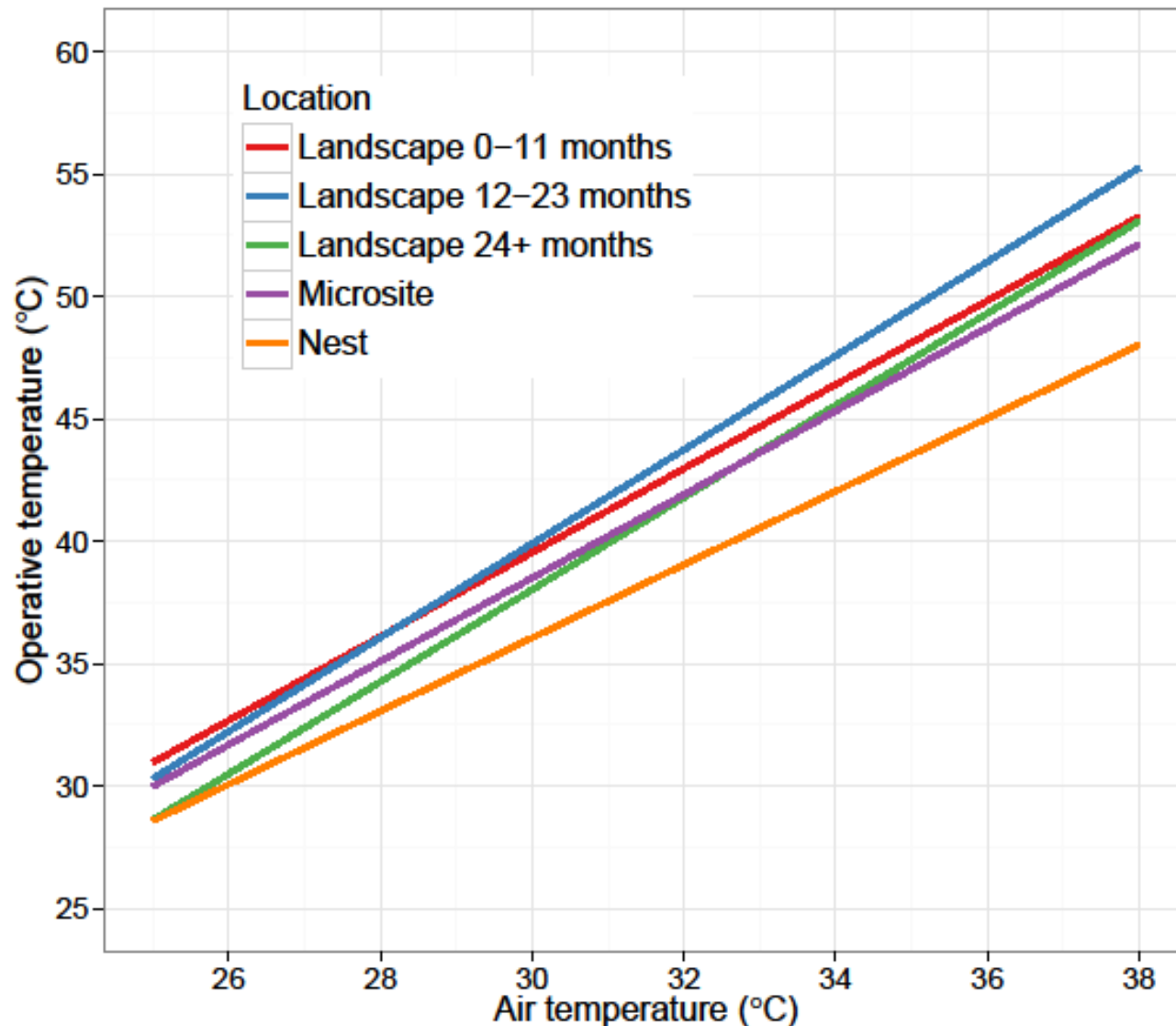
Robbins et al 2002



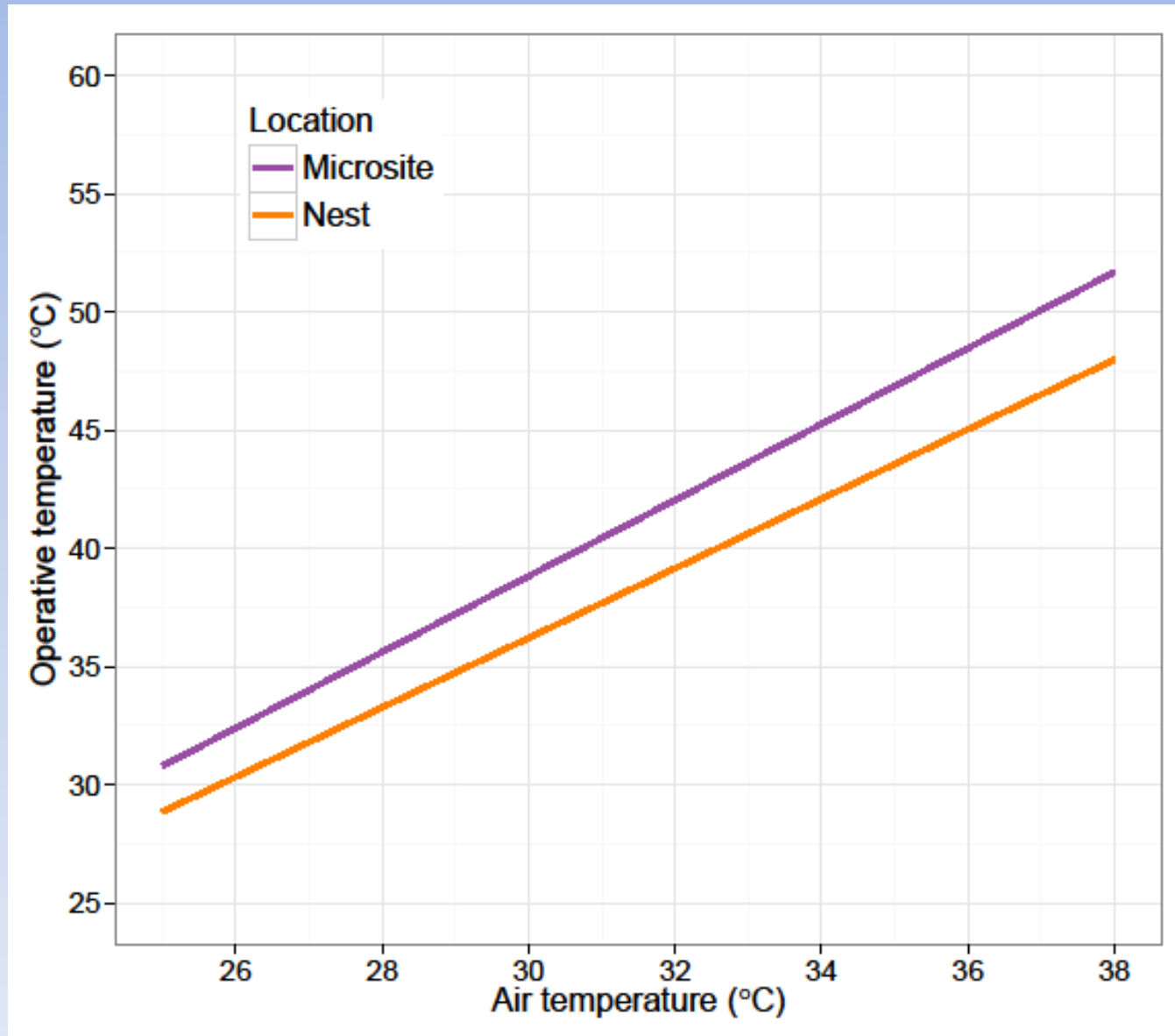
Fire, trees, and lek locations explained nest site selection



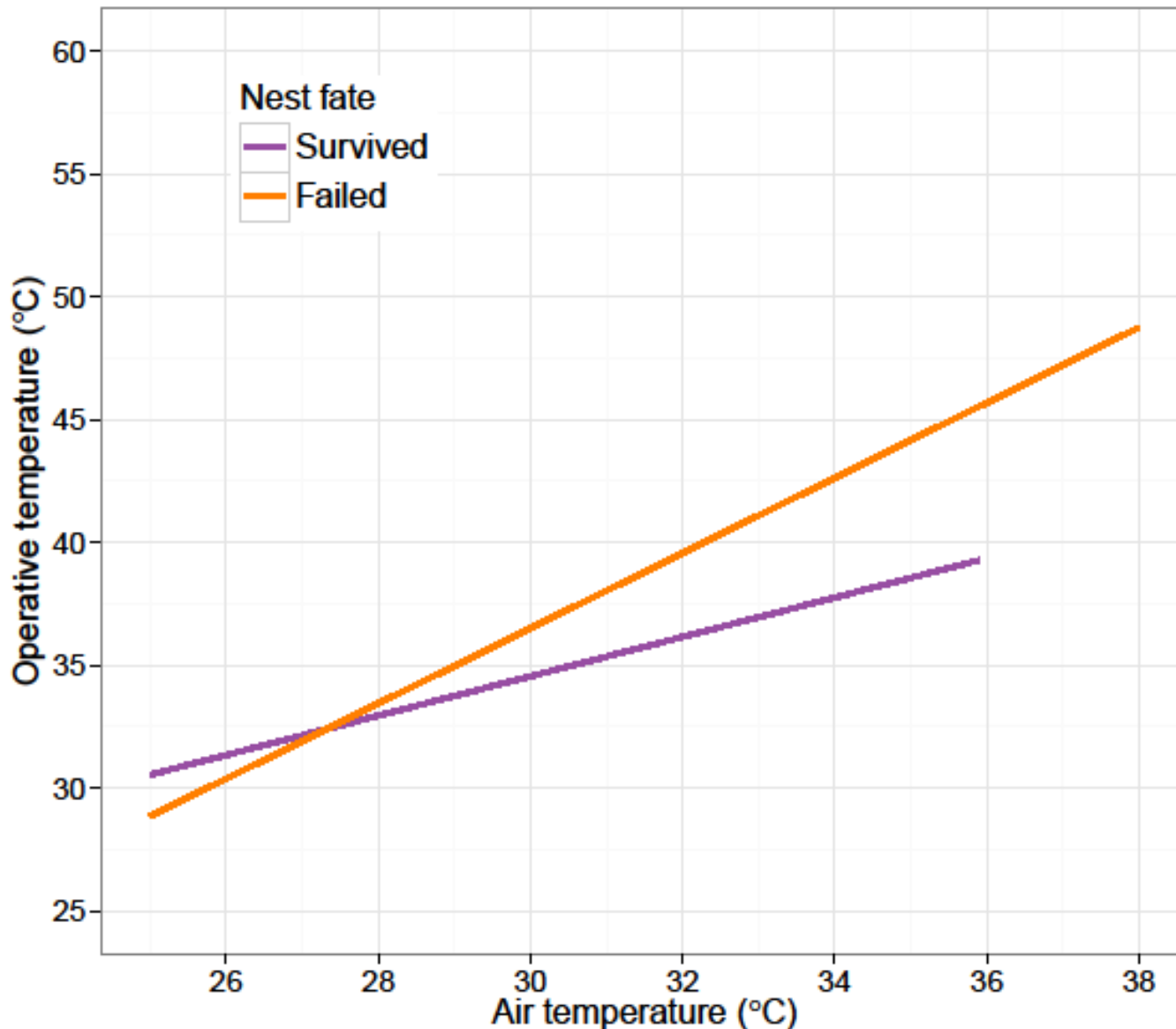
Nests were 4-8° C cooler than the landscape



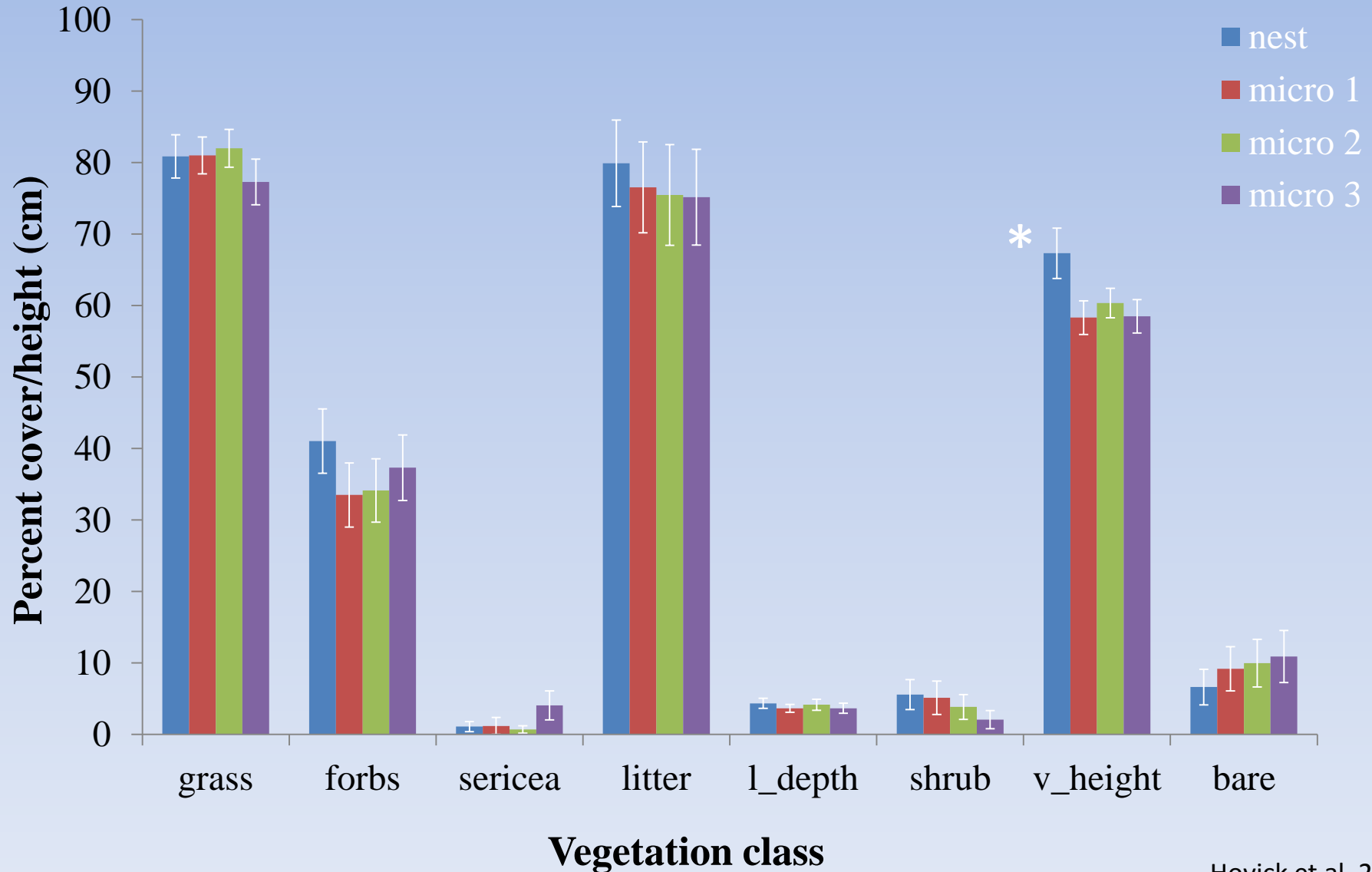
At fine scales (2 m) nest sites were up to 4° C cooler



Successful nests averaged 6° C cooler than failed nests at 36° C air temperature



Nest site vegetation was taller than surrounding micro-sites





Lekking

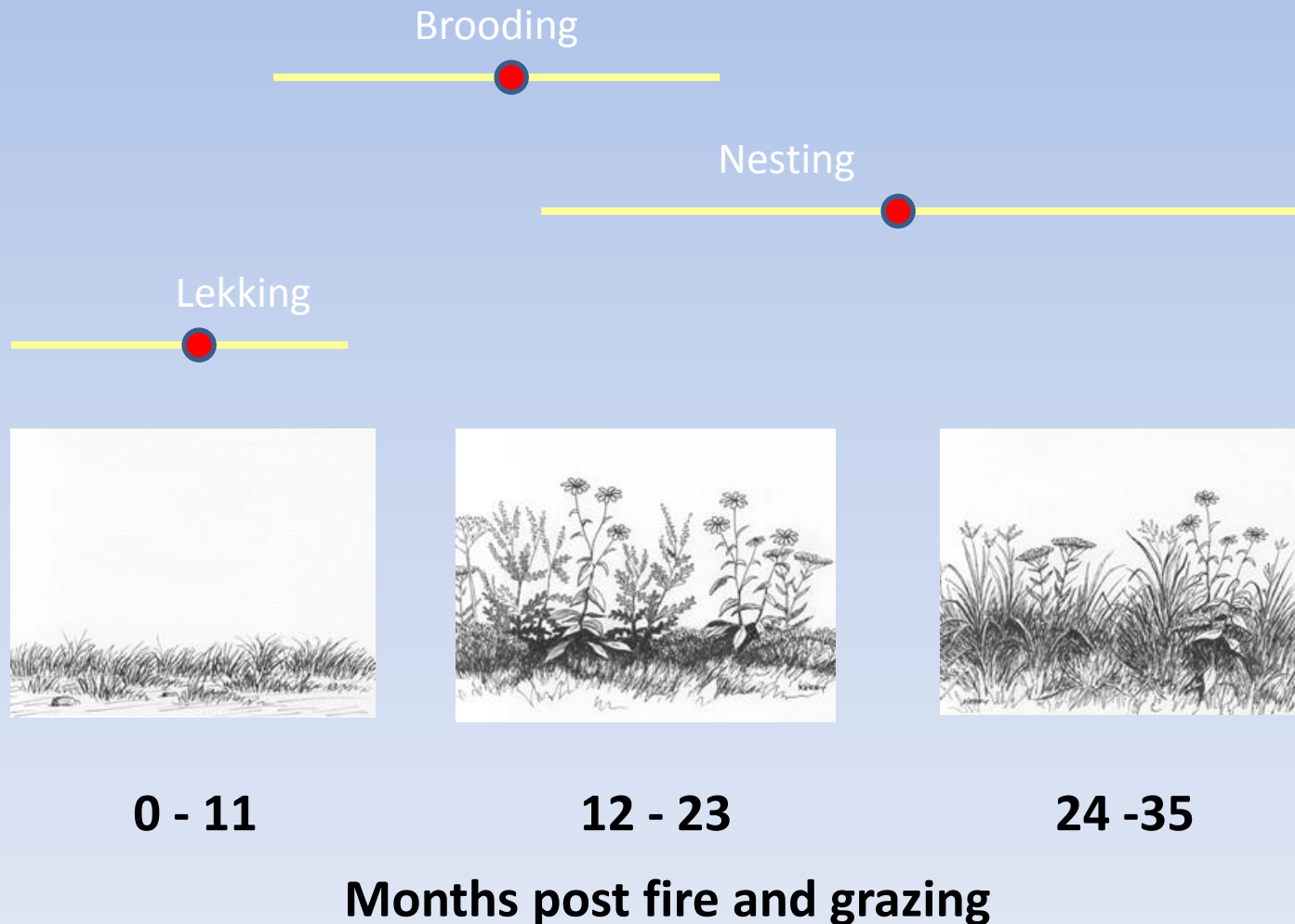
Lek locations are predictable.

Lek locations are somewhat indicative of habitat suitability of surrounding area.

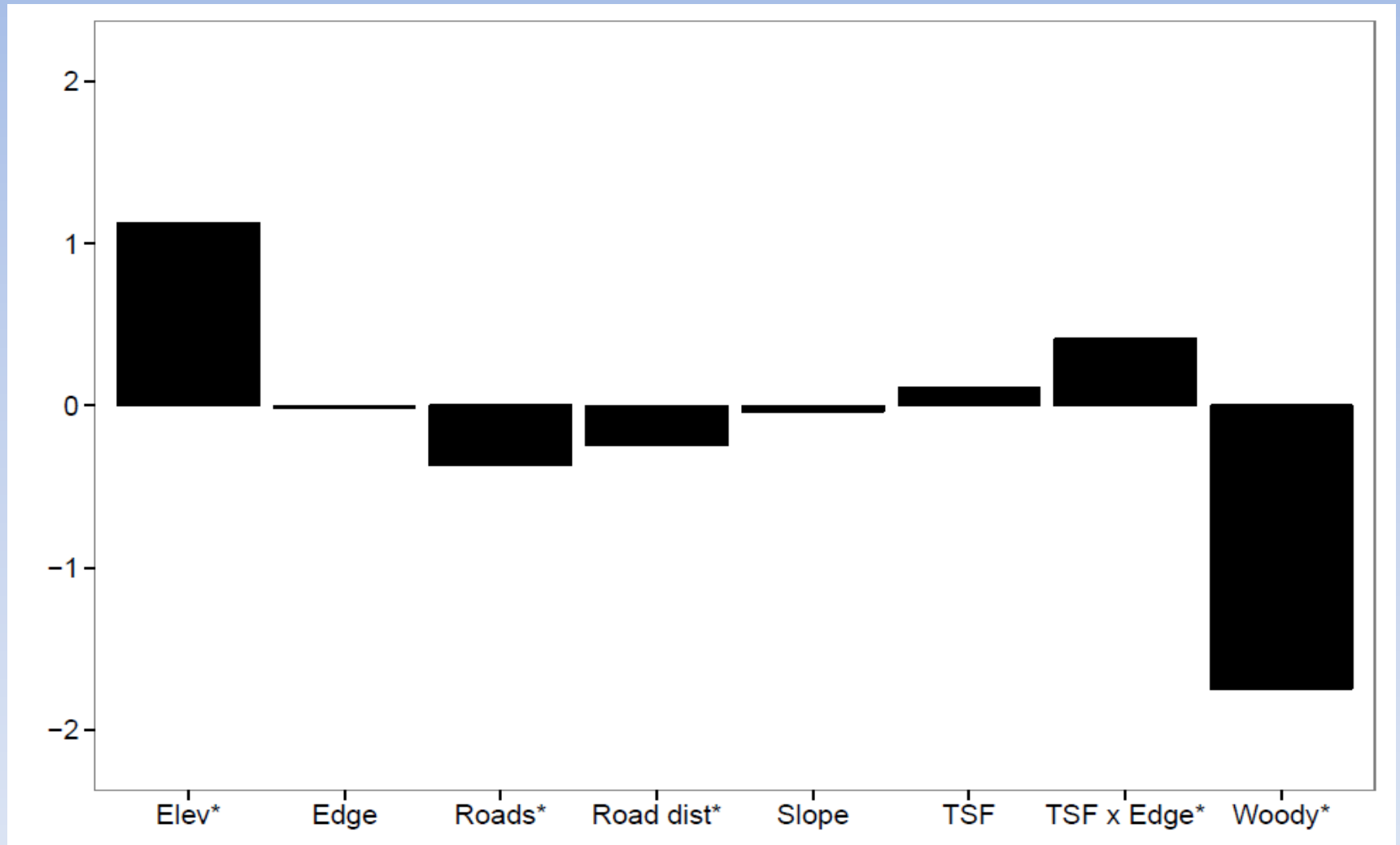
Require auditory and visual liberty.



Life history traits of Greater Prairie-Chickens require a range of cover and composition



Greater Prairie-Chicken RSF

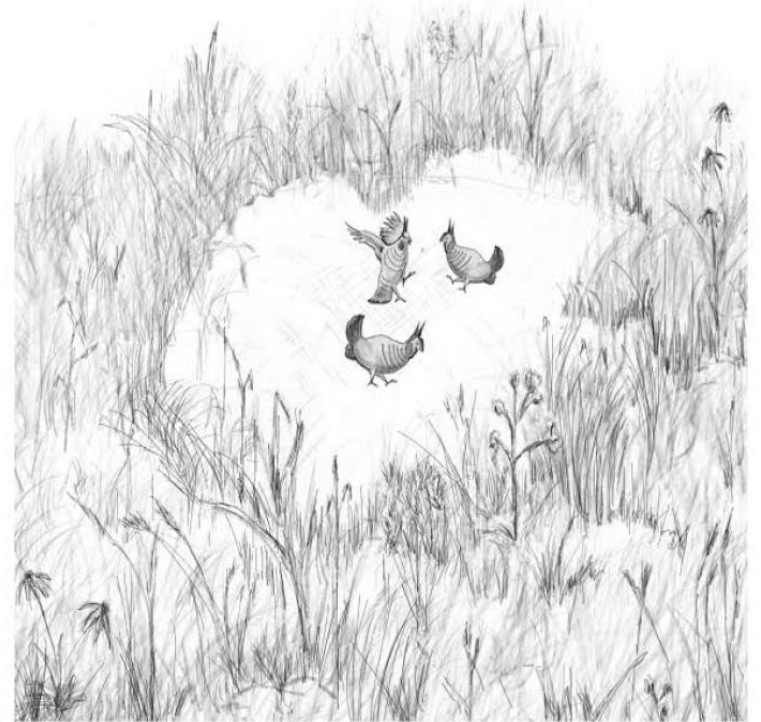


Fire and Edge Relationship with Leks

a.



b.



Summary of GPC Fire Research

GPC use all available time since fires (TSF).

GPC strongly avoid tree cover during breeding season.

GPC select greater TSF for nesting.

Nest survival increases with greater TSF.

Nest survival is not just about cover from predators, temp matters.

Leks are dynamic when disturbances are dynamic.



Lesser Prairie-Chicken

Tympanuchus pallidicinctus

90% reduction in range

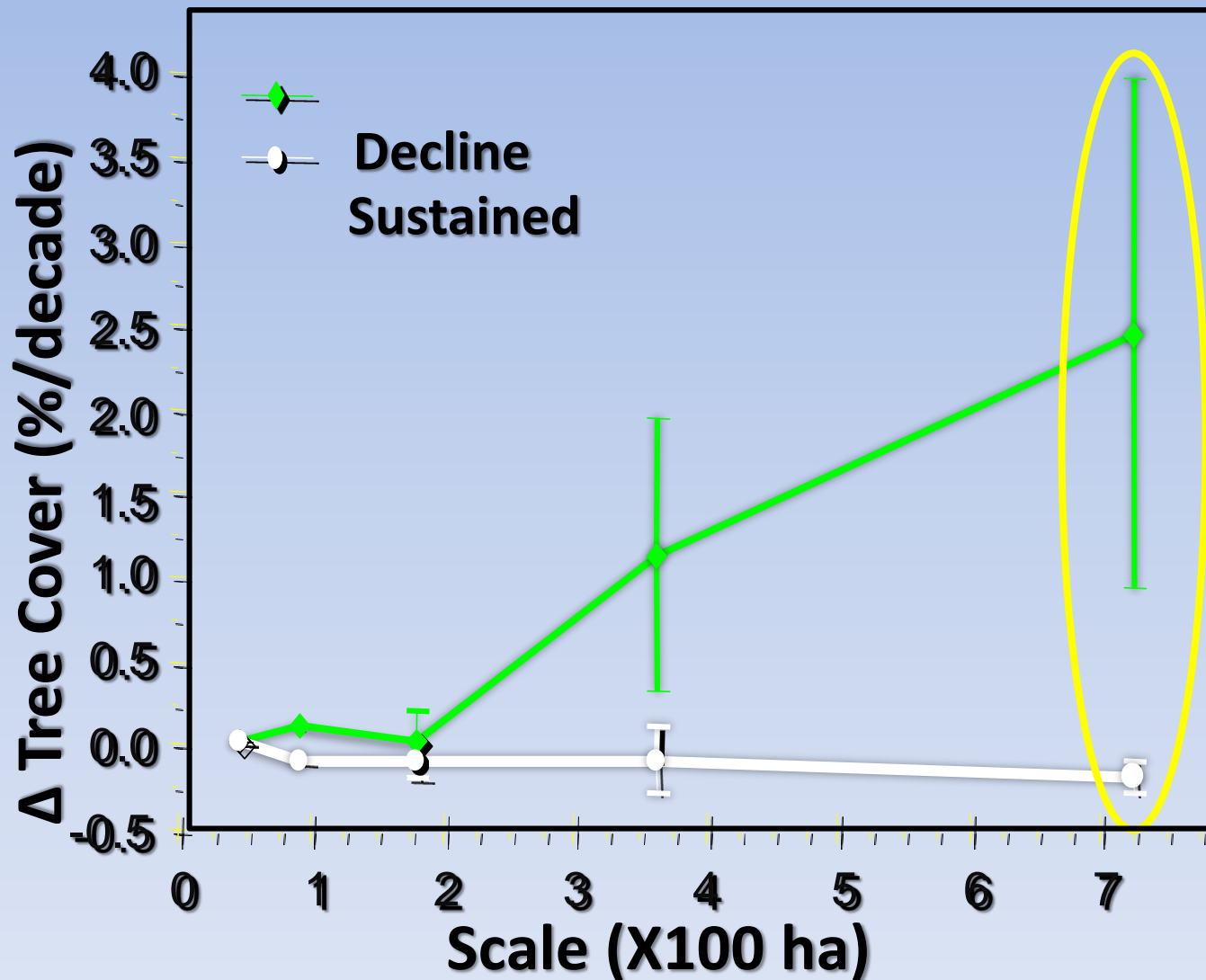
ESA Threatened

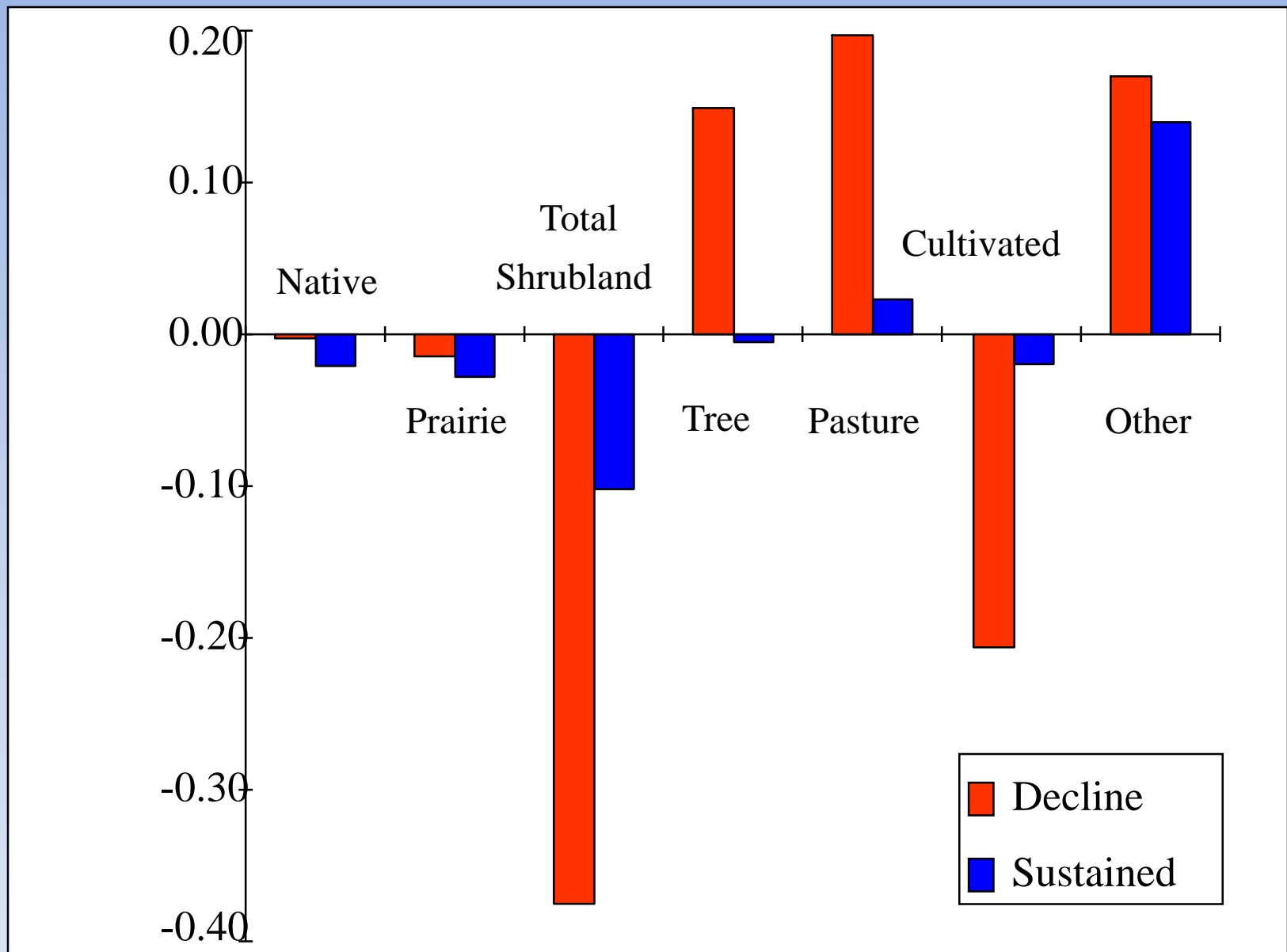
Occurs in mixed-grass prairie, sand sagebrush, and shinnery oak.



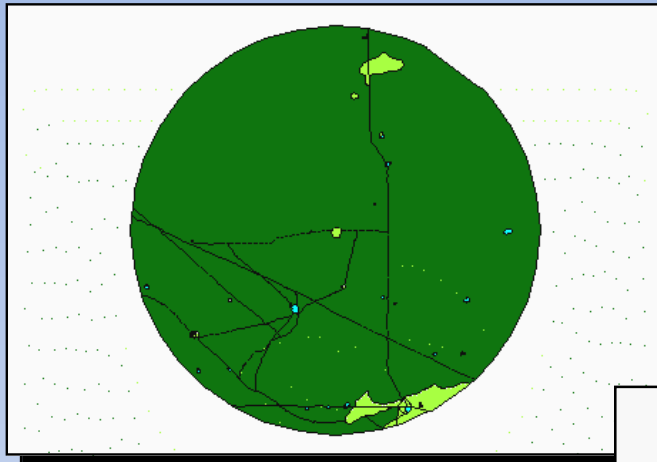


Juniper Encroachment

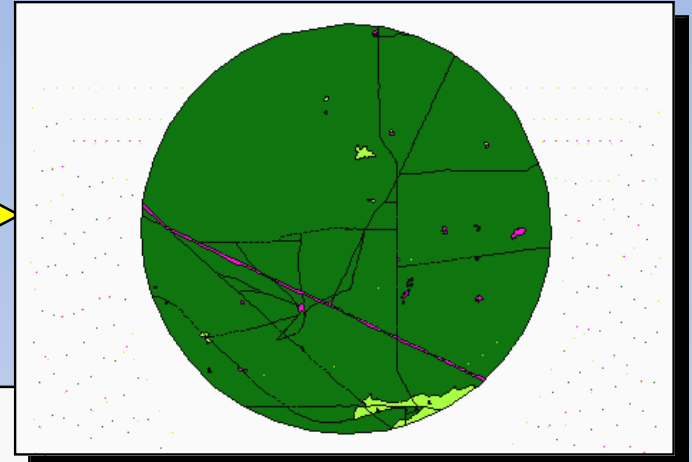




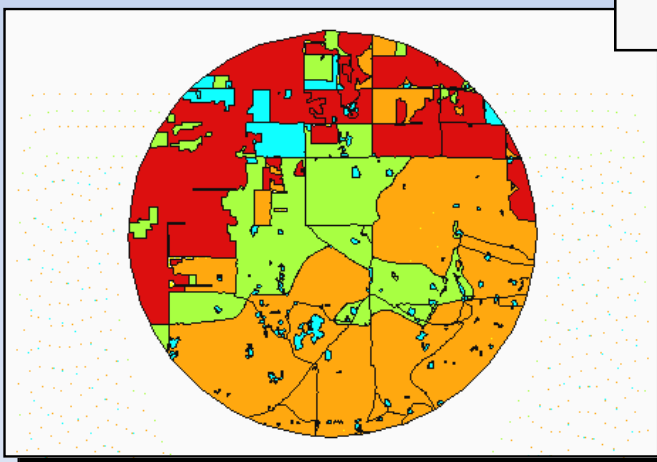
Not Declining



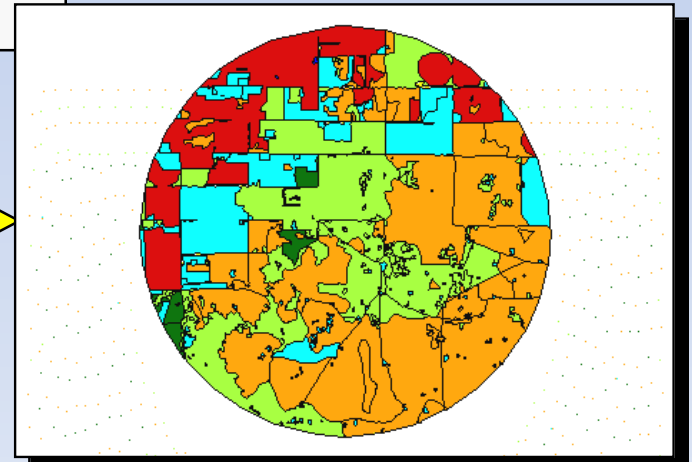
10 yrs



Declining



12 yrs



- Shrub Mix
- Cultivated
- Native Grass
- Shinnery
- Pasture



Vermeire 2002

96% of burned shrubs survived

Canopy volume 38% and 64% of preburn 1 and 2 yr TSF respectively

Height and area was 80% of preburn 2 yr TSF

Fall burned shrubs initiated growth 1 month prior to nonburned

Little difference in plant community between season of burn

Herbaceous cover 50% of unburned

Forbs increased 60% on burns

Winter 2010

Shrub height and volume recovered by 4 yr TSF

Shrub area recovered by 3 yr TSF

No difference in shrub characteristics between once and twice burned plots

Forb and grass cover did not increase with fire

Bare ground was higher for 2 yr TSF





Boyd and Bidwell 2007

Fire decreased shrub cover for 2 years.

Fire decreased grass cover for 1 year.

Fire increased forb cover for 1 year.

Fire increased grasshoppers for 2 years.

Within 2-3 years plant structure and composition returns to preburn conditions.

Minimal differences between season of fire.



Summary: Resprouting Shrubs

Temporary increase in herbaceous dominance

Minimal negative effect (if any) on density

Management with fire requires high frequency
(e.g. 2-5 year return interval).

Regrowth 10 years after fire



Season has minimal long-term effects in grasslands

Howe 1994

Engle et al. 2000

Engle and Bidwell 2001

Brockway et al. 2002

Towne and Kemp 2003

Fuhlendorf and Engle 2004

Fuhlendorf et al. 2006

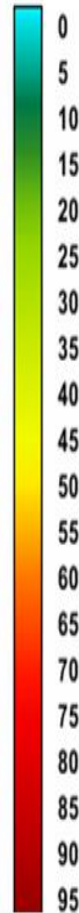
Ansley et al. 2006



LANDFIRE Data Distribution Site

View Legends

us_100 Vegetation Departure (VDEP)



General Recommendations for Prairie-Chickens

Maintain >75% of landscape in native grassland.

Use prescribed fire > 1-3 times per decade to minimize tree encroachment.

Leave >50% of the landscape unburned for >24 months.

Maintain high plant diversity including forbs.

Minimize human activity and structures within areas occupied by prairie-chickens.

Summary

Changes in fire frequency are one of the greatest threats to prairie-chickens.

Plant communities in the Southern Great Plains are highly resilient to fire.

Data on direct grouse response to fire is lacking.

Fire should be viewed as a process.

Ongoing Work

Unger et al. – LPC and land use

Starns et al. – Fire and grazing/prairie-chicken habitat

Haukos et al. – LPC and juniper

Carleton et al. – LPC and mesquite

Further Information

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- Cannon, R. W., and F. L. Knopf. 1979. Lesser prairie chicken responses to range fires at the booming ground. *Wildlife Society Bulletin* 44-46.